

for the remainder of the year, coinciding with a reduction in intensity of advertising volume.

- Broadcast media, radio and television, were the source of first awareness for 45% of new users of SmarTraveler Boston.
- In 2000, TravInfo fielded a nearly continuous advertising campaign using roadside billboards, limited radio spots, internet banners, large print ads in the regional AAA publication, and ads on AAA maps for the greater San Francisco Bay region. Monthly caller volume rose 73% over 1999 levels (unadjusted).

### **What are the known obstacles to broad ATIS adoption?**

- Experience suggests that the largest obstacle to greater ATIS use is lack of awareness. Survey data indicates few members of the general public are aware of ATIS availability. The Partners In Motion surveys conducted in 1998 and 1999 revealed surprisingly small market awareness for SmarTraveler in the Washington DC market, numbers falling below the 20% threshold. Because ATIS use requires a behavioral shift, sustained advertising is required. Research is needed to identify acceptable growth and penetration rates associated with certain marketing initiatives.
- Some research indicates that data quality and coverage figures prominently in travelers' willingness to use ATIS. However, it is clearly identified in focus groups that the perception of quality is truly a subjective measure, and is influenced by a multitude of personal, environmental, and situational factors very difficult to pinpoint. This is an area where additional research is most clearly warranted.
- Some focus group studies with people who are not ATIS customers suggest that, in general, drivers don't believe that traffic information will help them. This obstacle can be addressed with good marketing, as an advertising campaign would highlight the benefits of ATIS.

### **Conclusions: Missing data and other observations**

- Additional human factors research into driver workload parameters, and the impact of various personal and environmental factors, as well as ATIS strategies, on that workload.
- While limited in scope, the data from transit riders who use ATIS appears sufficient as a base for service development.
- There is no conclusive data on the impact of improved transit information services on ridership levels or rider retention.
- There is insufficient data on the question of how traveler information can influence mode split. Existing data is promising, although inconclusive. If 511 is intended to influence mode split as a strategy for improving traveler mobility, then further research is required.

- Focus groups in the Washington DC market revealed that some groups would trust the information more if it came from a private company, although they would not have a problem if that company was sponsored by a state or local government agency.
- There is no data in the public domain on customer response to or demand for an integrated multimodal information service that enables trip planning using auto, transit, paratransit, intercity rail and bus, and air.
- Further exploration into the topic of Data Quality is warranted. Focus group results reveal quality of information to be a potential determining factor for use, yet the definition of quality is incredibly diverse.
- There is limited information describing customer response to dynamic route guidance.
- Additional research on the potential impacts of various marketing schemes to ATIS telephone usage is warranted.
- Very little is known about how to provide traveler information services that are useful to unfamiliar travelers. Most of the evaluation data cited in this paper refer to familiar travelers.
- While there is data from respondents describing what types of decisions customers make with traveler information, the data is not of sufficient caliber to support ATIS operations or planning models.

## Sources

### *Field Operational Test Evaluations*

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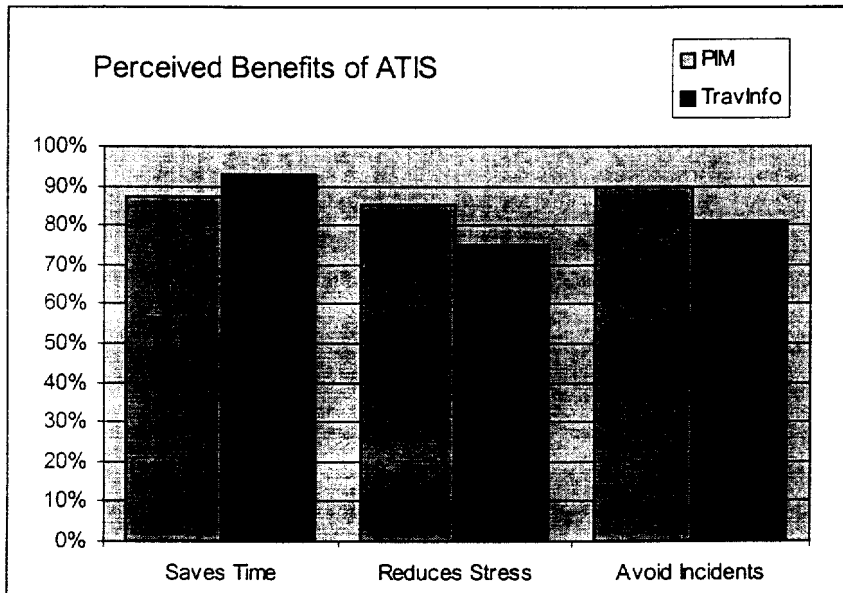
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- 90% of the respondents to the Partners in Motion evaluation of SmarTraveler reported that it helps them avoid traffic problems; 87% reported that it saves time; 85% reported that it reduces anxiety.
- 93% of respondents to the Seattle traffic web site survey reported that it helped them to saved time; 81% agreed that it helped them avoid traffic incidents; approximately 75% said it reduced stress; and, about one-third agreed that they used the site to avoid unsafe driving conditions.
- 39% of TravInfo respondents identified informed travel decisions as their primary benefit; 36% identified travel time-savings, and 18% identified reduced stress.



- Transit customers report that ATIS saves them time, helps with route selection, reduces the uncertainty of waiting (when the service is real-time), and increases their satisfaction with the decision to take transit.

#### **What level of service do ATIS customers demand?**

- Respondents to all surveys are very clear in their quality requirements for traffic information. Traffic customers want quick, simple, and safe access to accurate, timely, reliable, route-specific traffic information. They want coverage of highways and major arterials, direct measures of speed for each highway segment, identification and description of incidents, and travel time between origin and destination.

- Respondents to the Partners in Motion evaluation and SmarTraveler Boston found the abbreviated keypad access to be convenient. Over 80% of Partners in Motion respondents agreed that it was easy to get information from that service.
- Some experts believe that the presence of advertising will reduce usage of ATIS telephone systems. However, there is no clear evidence as to the impact of advertising on usage. Some existing SmarTraveler telephone services did indeed place pre- and post-report advertisements on their phone services, and noted only minor fluctuations in call volumes. Fluctuations that could easily be attributed to other environmental factors, not the advertisements themselves. Other IVR systems outside of ATIS have relied upon advertising, such as MoviePhone in NYC, and the recent influx of “voice portal” systems such as BeVocal and TellMe. All of these examples have witnessed continued increase in use, yet rely on advertisements to support revenue needs.
- Seattle respondents said that weather conditions are useful where they affect driving conditions, especially during inclement weather situations (rain, snow). Other environmental factors such as sun glare, fog, wind, etc, play a role in determined traffic and travel behaviors. General weather conditions, such as a predicted weather report for the remainder of the day, have been found to be useful by customers of ATIS systems. TravInfo, in San Francisco, did not receive similar suggestions from customers.
- Demand for dynamic route guidance varies with the customers’ level of familiarity with local traffic patterns, alternative routes, and gender -- tourists, unfamiliar drivers, and women having most interest in the service.
- ATIS transit customers want information that reduces trip time uncertainty: real-time information, convenient and distributed access, and good quality interfaces.
- For static information, transit customers want current fares, transit schedules and routes, transfer locations and times, detailed maps, and bus stop locations. Traffic customers want additional information on major construction projects, planned events (especially in the vicinity of major sports/entertainment venues), and anomalies such as government holidays that will impact traffic volumes during regular commuting hours.
- ATIS transit customers also want point-to-point itineraries for both transit and multimodal trips, and recommended routes and times for fastest travel to their destination.

## **Marketing ATIS**

- In its evaluation of SmarTraveler Boston, MultiSystems observed a correlation between advertising and call counts: each airing of a radio advertisement was correlated with an increase of 75 calls on the following day.
- Also in Boston, it appeared that the call growth rate intensified during the three-month period of intensifying advertising, followed by a noticeable drop in growth rate

- Research findings suggest that rural ATIS customers are
  - Long-distance drivers with need for road condition information,
  - Tourists with need for road condition information, route guidance, and interest in recreational information, and
  - Local residents with need for road condition information or paratransit services.

### **How do customers use ATIS?**

- Drivers use ATIS (in rank order) to assess traffic delays, judge the effects of incidents on their trip, decide among alternate routes, estimate how long a trip will take, and decide when to start a trip. Drivers use ATIS less frequently to make a mode choice. Very few drivers change modes with the information.
- The greatest volume of ATIS phone calls and web site consults occur for the afternoon commute from work. The second largest volume is for the morning commute to work. This is true for all ATIS traffic services. Empirically measured traffic data from Seattle confirm that the afternoon peak period is longer and more unpredictable than the morning trip.
- Among Seattle traffic web site users who consult ATIS for their morning trip to work, the most frequent change they report is delayed departure, followed by a route change. For the afternoon commute from work, over 70% of Seattle web site survey respondents said that they left later as a result of traffic conditions; 65% said they had changed a small part of their route; 62% took an entirely different route from their usual route; 53% left earlier; and 36% made stops that they otherwise would not have made (*Please note: these data do not add to 100%; respondents made multiple changes to their trip*). A much smaller percentage of SmarTraveler Boston respondents changed their intended trip as a result of traffic information.
- In one study, route change behavior appears to be linked to customers' confidence in the quality of the traffic information. The TravInfo evaluation reports that 25% of respondents who received relevant traffic information from television or radio changed some aspect of their trip versus 45% of TravInfo phone service users and 81% of TravInfo web site users. However, repeated analysis across multiple markets would be required to determine the true "reason" for route change. Some experts believe that use of ATIS services will by nature heighten the perceived confidence in the content, simply due to the fact that it is new and often delivered via a medium traditionally associated with high-tech or new.
  - All survey respondents say they will listen to radio traffic but find it lacking in accuracy, timeliness, coverage, and personal relevance. All customers with experience of phone, web, or TV-based traffic information rate those services as higher in overall quality than broadcast radio traffic reports.
- Bad weather dramatically increases demand for traffic information. During winter weather and floods, web site user sessions increased over 10 times on the traffic web sites in Seattle and San Antonio. Similar increases in phone volume have been

observed by TravInfo in greater San Francisco, Smart Route Systems Boston, and Partners in Motion in greater Washington, D.C. Some existing ATIS telephone systems have difficulty handling abnormal call volumes by design, others have ample “line capacity” available to handle the highest possible situation. Unfortunately, additional research is required to more succinctly equate marketing to usage levels.

- Traffic phone customers most frequently consult ATIS services via mobile phone during their commute to or from work. For example, 64% of all intercepted calls to ARTIMIS were from mobile phones, and 70% of survey respondents said they usually call from their vehicle; 45% of all callers and 61% of call volume to SmarTraveler Boston in 1994 were from mobile phones (30% of the population owned cellular phones). It’s important to note, however, that as mobile phone usage continues it’s dramatic increase, we anticipate this will impact ATIS telephone usage, but the extent of which is yet to be clarified.
- Traffic customers consult ATIS regularly, with the average users in Seattle (web) and Boston (phone) consulting as often as once a workday and frequent users consulting twice a workday or more. Comparison of Boston SmarTraveler user data from 1993 to 1994 shows that the greatest increase in caller volume came from experienced users, whose call frequency increased approximately 30% per week for cellular and 50% per week for landline users. Similarly, data from Seattle (web) shows that more experienced customers make more frequent use of the service.
- Transit customers consult ATIS much less frequently than traffic customers, partly because most remote-access data, such as phone and web services, are not real-time. Where real-time data is available, such as *TransitWatch™* at transit terminals in King County, Washington, two thirds of those riders who knew of the service’s existence consulted it, and approximately one-third said that they consulted the real-time bus status monitor every time they took the bus.
- Transit riders’ use of and personal benefit from ATIS depends on the content, quality, and location of the service. They use static information for trip planning. Real-time information on platforms enables en-route planning, effective use of waiting time, and notification to others of arrival time. Real-time information by phone or web enables better-timed departures and shorter overall trips.
- Travelers planning trips to remote areas subject to weather problems, such as Snoqualmie Pass in Washington and northwest Arizona, will check traffic reports to plan their trip, including route, time of departure, and special supplies, such as tire chains.
- Research findings suggest that travelers in rural areas would use road condition information and make route changes as needed.

#### **What benefits does ATIS provide to customers?**

- Traffic customers report that ATIS saves time, enables them to avoid congestion, reduces stress associated with uncertainty, and increases safety.

## Bringing 511 to market: What do users want?

This paper briefly identifies what is known about advanced traveler information service (ATIS) customer preferences from recent ATIS field test and deployment evaluations. From these studies on ATIS in general, you may infer that a 511 consumer will have similar needs and wants. Please refer to page 7 for a list of sources consulted for this paper.

For the purposes of this paper, ATIS is confined to real-time traffic and transit system data, excluding information on (1) other modes of travel, (2) static route guidance, and (3) recreational information. With a few exceptions, most customer data addressing these three services are in the private domain. Most ATIS customer data in the public domain addresses local metropolitan area travelers; there are some data among the rural ATIS evaluations that measure the ATIS needs of rural and unfamiliar drivers.

### Outline

- Summary
- Who is the customer?
- How do customers use ATIS?
- What benefits does ATIS provide to customers?
- What level of service do ATIS customers demand?
- Marketing ATIS
- What are the known obstacles to broad ATIS adoption?
- Conclusions: Missing data and other observations
- Sources

### Summary

**Customer:** Most ATIS customers are employed commuters. They are primarily drivers, male, between the ages of 25-65, with higher than average education and income. Of those who access ATIS by phone, a majority of customers own mobile phones. This profile is confirmed in all research sources.

**Typical use:** The typical ATIS customer listens to radio or TV traffic reports as part of the news before departing for work in the morning. If there is unusual congestion or there has been an incident on their route, they may delay their departure time or change route. Depending on conditions encountered en-route, the customer may phone ATIS for details about the delay, or for information on an alternate route. Many more ATIS consumers check ATIS in the afternoon before departing from work, or while en-route soon after their departure. Afternoon traffic conditions are considered to be more unpredictable than morning conditions. If they make a change in their afternoon trip plans as a result of the traffic information, consumers most frequently will delay their departure, or choose an alternate route.

**Service requirements:** Customers want quick, simple, safe access to accurate, timely, reliable, route-specific information. They want coverage of highways and major arterials,

direct measures of speed for each highway segment, identification and description of incidents, and travel time between origin and destination.

**Benefits:** The greatest value of ATIS to customers is saved time, avoidance of traffic congestion, and reduced stress. Transit customers report that ATIS saves time, helps with route selection, reduces uncertainty, and increases their satisfaction with the decision to take transit.

**Marketing:** Lack of consumer awareness of ATIS and the benefits it can provide are one of the largest obstacles to ATIS use. None of the field tests or deployments have had marketing budgets sufficient to bring an innovative service to the consumer market. Where there has been advertising, there has been a measured increase in ATIS use rates. There is no evaluation data on how to effectively market and advertise ATIS and the costs thereof.

**Obstacles:** The primary obstacles to more widespread ATIS adoption are lack of consumer awareness, poor data quality, and lack of consumer belief in the value of ATIS. In some regions, insufficient coverage of the road network also contributes to low use levels.

**Missing data:** Conclusive human factors research establishing the safest methods and interface for communicating ATIS to drivers is needed. There is scant data on customer response to transit and multimodal ATIS, and the impact of ATIS on mode split. Little is known about how to effectively market ATIS and the associated costs. Little is known about how to provide ATIS to meet the needs of unfamiliar travelers.

### **Who is the customer?**

- ATIS customers to date are primarily drivers, between the ages of 25 and 55, who commute to work alone by car. Drivers' interest in ATIS increases with education, income, congestion level, arrival time flexibility, and constrained alternative route availability.
- Phone service users as a subset of all users are slightly older and slightly more likely to be male. Data from a limited number of ATIS telephone evaluations indicate that phone customers are 35-55 years of age, primarily male, have above average income and education, and commute to work alone by car. However, the rapid increase in mobile phone usage over the past 24 months has undoubtedly changed the demographics of mobile phone users, and thus has likely altered the demographics of ATIS telephone users.
- More detailed market segmentation data for ATIS customers are available from the USDOT Metropolitan Model Deployment Initiative ATIS Customer Satisfaction Evaluation (reference page 8). This study uses population and customer data from the Puget Sound region to segment ATIS customers according to sociodemographic factors, values, and attitudes.
- There are too few ATIS transit customer evaluations to generalize about the ATIS transit customer. Seattle data suggest that ATIS transit customers are employed, somewhat younger than average transit riders, of average income (relative to transit customers), and have limited access to a car.



## **The Other N11s: How Are They Provided?**

### **Overview**

This paper will overview the other abbreviated dialing codes services and describe their purpose, methods of operation, funding, and historical evolution.

### **Service Listing Summary**

- 211 – Assigned for community information and referral services.
- 311 – Assigned nationwide non-emergency police and other government services.
- 411 – Unassigned, but used virtually nationwide by carriers for directory assistance.
- 511 – Assigned for traffic and transportation information.
- 611 – Unassigned, but used broadly by Local Exchange Carriers (LEC) for repair service.
- 711 – Assigned nationwide for access to Telecom Relay Services (TRS) for individuals who are deaf, hard of hearing, or have speech disabilities and voice users.
- 811 – Unassigned, but used broadly by LECs for business office use.
- 911 – Assigned as the universal emergency telephone number.

### **How is it done?**

Three Digit Dialing Services are designed with efficiency and reliability in mind. Here's how the service works:

- A three-digit N11 code is assigned for use to a “subscriber” in a specific local calling area.
- The subscriber obtains/secures/designates a 7 or 10 digit local number to route the calls made to the three-digit number.
- All switches within the basic local calling area are programmed to translate the three-digit code to the designated point-to number.
- A caller dials the three-digit code associated with a subscriber's information service and/or customer service organization.
- The switch recognizes the three-digit code as an abbreviated dialing string, deletes the three-digits from the dialing string and translates them into the 7 or 10 digit “point-to” number.
- The switch routes the call to the 7 or 10 digit point-to number.
- The N11 subscriber pays for the calls that are routed to the “point-to” number.
- If a subscriber chooses to charge callers for accessing their information, the carrier can record and rate the call for the subscriber via a billing and collection agreement.

### **Three Digit Dialing Costing Elements**

- Service Establishment fee - this is a one-time setup cost based upon population size of calling area.
- Usage Charges – a monthly recurring cost based upon quantity of calls placed to the three-digit code. In several states, a minimum monthly usage charge applies after the initial six months the service has been activated.
- Change of “point-to” number.
- Billing arrangement change - revisions in amounts charged to end-users, change in recording and rating, etc.
- Detailed monthly reports - amount of detail, frequency. May or may not be included as part of the usage charges.

## N11 SUMMARY DATA

| N11 | USAGE   | EXTENT OF USE   | HOW PAID FOR                      | LESSONS FOR 511  |
|-----|---|---|-----------------------------------|--|
| 211 | Access to organizations providing community information and referral services.  | Larger cities in CT, GA, LA, TN, AL, MS, NC, OH, and UT are currently implementing.                                     | Donations to agencies and grants. | <ul style="list-style-type: none"> <li>• Multilingual capability needs to be built into the system.</li> <li>• An Interactive Voice Response (IVR) capability can be utilized to support automatic referrals during peak call volume.</li> <li>• Use of Web sites to augment services offered.</li> <li>• Service levels need to be agreed upon prior to start-up – more staff or equipment may be required if the service wishes to maintain a low abandonment rate (i.e., hang-up) and low average speeds of answering (i.e., time caller is waiting)</li> <li>• Potential for balkanization of services, different uses in different regions</li> </ul> |
| 311 | Access to City or County government services (including non-emergency police). Calls answered by operators and forwarded to appropriate agency. | Larger cities in TX, AZ, IL, CA, MD, MI, NY use this service.   | Funded by providers.              | <ul style="list-style-type: none"> <li>• Monitoring the level and quality of service provided to customers.</li> <li>• Quality review process in place.</li> <li>• Priority and urgency of response is determined by <u>documented</u> policies and procedures.</li> <li>• Establishment of a formal training program for operators.</li> </ul>  |
| 411 | Directory Assistance  | Local phone companies, long-distance carriers and many independent providers provide this service.                      | Costs passed back to users.       | <ul style="list-style-type: none"> <li>• Multiple service providers may use multiple databases. This can result in inconsistencies in finding numbers, services, or data. Provisioning for services should be uniform within a market area, region, and ultimately within the entire state area.</li> <li>• A customer service (i.e., directory assistance) needs to be simple and provide value. With competition among directory assistance services the result has been the quality of service remains essentially the same, yet costs are escalating.</li> </ul>   |
| 711 | Access to nationwide Telecom Relay Services (TRS) for individuals who are deaf, hard of hearing, or have speech disabilities.                   | DE, HI, MD, ME, MA, NH, NY, PA, RI, VT, DC and WV provide this service.   | Costs funded by carriers.         | <ul style="list-style-type: none"> <li>• Lessons are similar to those found for 211/311 services.</li> </ul>   |
| 911 | Universal emergency telephone number. Connects to Public Safety Answering Point (PSAP)  | Widely utilized nationally, though some communities are still using 7 or 10 digit dialing to access emergency services. | Surcharge on customer phone bill. | <ul style="list-style-type: none"> <li>• Provisioning should be uniform with market area.</li> <li>• Level of service and quality of service continually monitored.</li> <li>• Development of contingency plans by PSAPs can ensure continuity of service.</li> <li>• Priority and urgency of response is determined by documented policies and procedures.</li> <li>• Formal initial and refresher training ensures consistent quality of service.</li> </ul>   |

## 511: A Summary of the FCC's Report and Order

The U.S. Department of Transportation's petition to establish a national three digit dialing code for traveler information was granted by the Federal Communications Commission on July 21, 2000 in a Report and Order<sup>1</sup>, which assigned 511 as an abbreviated dialing code for travel information services.

The FCC's order makes seven specific points in the assignment of 511. They are:

1. 511 is assigned to government entities for both wireline and wireless telephone services.
2. Technical details of implementation and cost recovery are left with Federal, State, and Local transportation agencies to determine.
3. Federal, State, and Local transportation agencies are to determine the type of information to be provided.
4. Federal, State, and Local transportation agencies are encouraged to ensure that 511 transcends municipal boundaries and is appropriate to the national designation of the number.
5. Transportation agencies are encouraged to determine uniform standards for providing information to the public.
6. U.S. DOT is encouraged to facilitate ubiquitous deployment of 511.
7. The FCC will assess the deployment of 511 in 2005 to determine if the number is in widespread use.

The FCC order very deliberately allows broad discretion on the part of State and local transportation agencies in the implementation of 511. However, the FCC also makes it clear that the 511 number will belong to public agencies, not the private sector. Thus, a private provider of traveler information cannot obtain direct use of the 511 number. This means that State and local governments can use the private sector to provide the service, but only under the auspices of the public entities. In addition, the public agencies are responsible to determine the type of information that will be provided by 511.

Paying for the 511 services is left to the State and local agencies to determine. This is not a mandated public service. Therefore, the telecommunications companies are entitled to recover their costs, and State and local agencies could charge the public for these calls.

The assignment of 511 is nationwide and the FCC expects that the service will be available to the entire traveling public. However, the Commission realizes that this nationwide deployment will take time. The FCC uses the term "national scope" in discussing 511, while many in the transportation community interpret "national" to mean "federal". This is not the intent of the FCC. The U.S. DOT has been encouraged to facilitate deployment; not mandate it nor regulate it. Thus, the U.S. DOT is providing support to this coordination activity, and has announced the 511 conversion program to

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<sup>1</sup> Third Report and Order on Reconsideration, CC Docket No. 92-105; Federal Communications Commission; Adopted, July 21, 2000; Released, July 31, 2000.

assist in the conversion of existing traveler information systems using seven or ten digit telephone numbers..

The FCC encourages "uniform standards" for the implementation of 511 to the benefit of the traveling public. Again, the FCC did not imply that it was necessary to have "standards" sanctioned by a national Standards Development Organization, such as the IEEE or AASHTO. The term was meant to encourage a degree of uniformity to make the 511 service easy to use by the public as they travel across the country.

Finally, the FCC will look at the deployment of 511 in 2005 to determine if there is widespread deployment of 511. The three digit dialing codes, 211 through 911, are scarce resources. Thus, if the number is not being used the FCC could reassign the number to another use. However, there are no reporting requirements on 511 deployment inferred in this statement. The U.S. DOT will keep the FCC informed about the status of deployment to satisfy this requirement of the FCC.

## Core Wireless Terms

**Mobile Telephone Switching Office:** similar to the landline central office, except located near a wireless tower; the first stop a wireless call makes when being routed

**Cell:** basic geographic service area of a wireless communications system; created by the use of a low power wireless transmitter; often deployed in a grid fashion forming a honeycomb shape

**Roaming:** when a mobile telephone user leaves the local geographic area defined by their carrier, the user is said to be roaming and a higher fee schedule is usually applied; roaming areas vary greatly according to the agreement between the user and carrier; can also refer to the use of another carrier's service

## Computer Telephony Terms

**Computer telephony integration (CTI):** the application of computer intelligence to the making and receiving of phone calls, fax communications, and other complex messaging

**Voice recognition:** the ability to recognize spoken words with a computer application; can be likened to dictation in that the computer recognizes the spoken word but does not understand what is being said; typically users must speak slowly and distinctly for system to recognize all words

**Text to speech (TTS):** the process by which a computer converts any readable text into human sounding speech output; compelling for 511 use when used in concert with an interactive voice response system or voice portal; TTS can be either in digitized form (computer-sounding voice) or in concatenated form (phrases pre-recorded with human voice)

**Interactive voice response (IVR):** a software application that runs in conjunction with computer telephony hardware to capture touchtone telephone keypad inputs or spoken commands; the keypad inputs or spoken commands are typically used to make menu selections, answer yes/no questions, or to spell out certain words or names; allows the user to self-navigate systems without operator assistance; sometimes viewed as cumbersome by some users

**Voice portal:** a voice-activated Internet or information portal built on voice recognition and text-to-speech technologies; users call up interactive voice menus and forms through a telephone or a properly equipped computer; content accessed in this manner can be traditional web pages converted to sound files or customized information created by the voice portal vendor; call 1-800-555-TELL or 1-800-4B-VOCAL for good examples – some traffic information is available on each

**Voice over Internet protocol (VoIP):** a protocol that allows voice to be transmitted over a channel traditionally used for data; allows for consolidation of resources and saves money in many cases; VoIP enables cheaper routing/switching of voice communications than traditional equipment

**Voice Extensible Markup Language (VXML):** An Internet standard that defines voice segments and enables access to the Internet and other voice-activated devices

## Computer Telephony Terms and Technologies

This paper defines key technologies, concepts and terms in the telecommunications and computer-based telephony field that relate to 511. The terms have been separated into three categories: Core wireline/landline terms, wireless core terms, and computer telephony terms.

### Core Wireline/Landline Terms

**Tariffs:** published rates, specifications, and service conditions for an offered communications service; states general obligations of both the carrier and customer; tariffs do not have the force of law and may be found unlawful by the courts (depending on the state)

**Incumbent Local Exchange Carrier (ILEC):** traditional local telephone companies that, prior to deregulation of the telephone industry, had the exclusive right and responsibility to provide local telephone service; ILEC delineates these service providers from the new competitive providers (CLECs)

**Competitive Local Exchange Carrier (CLEC):** after deregulation, companies that traditionally had the exclusive, franchised right and responsibility to provide local transmission and switching services were joined by new companies that are free to offer comparable services; local exchange carriers (LEC) were born and traditional telcos became known as ILECs (incumbent LECs), while new, independent data and voice telecommunication services companies became known as CLECS

**Regional Bell Operating Company (RBOC):** remnants of the dismantled AT&T / Bell system; created as a result of the antitrust trial; originally there were seven RBOCs; seven RBOCs were created in 1984, through mergers four presently remain: SBC, Verizon, Qwest, and BellSouth

**Central Office (CO):** a building owned by the telephone company where calls are routed to their destination via a complex framework of additional central offices and other equipment; the first stop when a call is placed

**Loop:** medium, usually copper wire, which connects a telephone to the central office

**Trunk:** path for information transfer between central offices

**Port:** an interface of a computer, telephone system, or network device where signals may be supplied, extracted, or observed

**Private Branch Exchange (PBX):** a telephone system within an organization's premises that switches calls between internal users on internal lines while allowing all users to share a certain number of external telephone lines; typically used in a business/office location

**Public Switched Telephone Network (PSTN):** facilities and the associated equipment that make up the large network wherein calls are routed and managed

**Switch:** equipment used to interconnect telephone lines and trunks, can be implemented at central office locations and larger private locations

## Intellectual Property and Patents

This paper on intellectual property issues affecting 511 implementation presents an initial description of several topics of research and analysis currently under investigation. The topics discussed below are not an exhaustive list of all relevant issues. Any conclusions or recommendations outlined in this document are only preliminary and are subject to revision upon further review.

*Business Method Patents.* To date, three patents have been identified for services, systems or processes that appear similar to those contemplated being offered through the 511 code. These patents are not for specific physical items, but for processes or systems characterized as Business Method Patents. It is possible – and, in at least one instance, has already occurred – that holders of these patents may claim that certain 511 deployments infringe their rights. Public and private entities faced with these claims may be forced to pay licensing fees, alter their services or, at worst, stop their deployments altogether. Thus, it is important that those deploying 511 traveler information services be made aware of such patents and how to defend against potential infringement claims.

Section 101 of Title 35 of the United States Code defines the subject matter which may receive patent protection: “any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof.” Since at least 1972, the US Supreme Court has struggled with the question of whether computer-related inventions are patentable, finding initially for the negative. In 1981, the Court found that the mere incorporation of an equation, program or computer into a claim does not render it unpatentable. The claims should be viewed as a whole during the subject matter patentability inquiry under Section 101.

The patentability of Business Method Patents was first articulated by the Federal Circuit in State Street Bank & Trust Co. v. Signature Financial Group, Inc., 149 F.3d 1368 (Fed. Cir. 1998), *cert. denied*, 119 S. Ct. 851 (1999). The Federal Circuit established a new test to determine whether computer-related inventions are patentable: claims reciting a series of mathematical calculations performed by a machine to produce a useful, concrete, and tangible result define patentable subject matter. Thus, under the State Street ruling, business methods implemented on a computer are now patentable as long as the method is novel and non-obvious. The decision reversed earlier precedent that specifically held that business methods were generally not patentable. In AT&T Corp. v. Excel Communications, Inc., 172 F.3d 1352 (Fed. Cir. 1999), the Federal Circuit affirmed the rule pronounced in State Street, stating that an invention employing a mathematical algorithm is not invalid when the algorithm is applied in a useful way.

The State Street holding, and the resulting rush seeking patents for business methods, has engendered significant criticism. Many critics have argued that the US Patent & Trademark Office was too quick in granting such patents. On March 29, 2000, the USPTO announced an action plan to enhance the quality of the examination process for business method patent applications.

*State Immunity from Patent Infringement Claims* The US Constitution’s Eleventh Amendment and the related doctrine of sovereign immunity generally bar any patent infringement suit in

federal courts against a state, state agency, or state officer. Each state is a sovereign entity in the federal system, and it is inherent in the nature of sovereignty not to be amendable to a suit brought by a private interest without the state's consent. In fact, in 1999 the Supreme Court struck down as unconstitutional a federal statute that had abolished state immunity from federal court patent infringement suits. Any such claims against a state would have to proceed, if at all, the Supreme Court held, in accordance with state law. In Florida, for example, aggrieved parties may pursue a legislative remedy through a claims bill for payment in full, or judicially through a takings or conversion claim. Other states may set forth different mechanisms and remedies for these claims.

In contrast, a city, county or other political subdivision of a state is liable for any infringement of a patent arising from its activities. The Eleventh Amendment and the related doctrine of sovereign immunity of states do not extend to such entities.

*Specific Business Method Patents* As noted above, three existing Business Method Patents have been identified that appear to contemplate systems and services similar to those to be offered through the 511 code. The patents are, in order of their grant date:

- Patent No. 4,812,843 (granted March 1989 to C. Paul Champion, et al.) for "Telephone Accessible Information System," whereby a subscriber receives continuously updated information by way of a telephone, PC and/or personal paging device.
- Patent No. 5,214,689 (granted May 1993 to Next General Information, Inc.) for "Interactive Transit Information Systems," whereby a telephone caller interacts with the system by using a Dual Tone Multi-Frequency (DTMF) type telephone and hears instruction/information over the telephone in response to keypad entries on the telephone.
- Patent No. 5,959,577 (granted September 1999 to Rodric C. Fan, et al.) for "Method and Structure for Distribution of Travel Information Using Network," whereby a system processes position and travel-related information through a data processing station on a data network.

Each patent contains one or more "independent" claims that also include within themselves one or more discrete elements. Generally speaking, if any particular 511 implementation for traveler information services does not include any specific independent claim or one or more elements within such a claim, then the 511 system as implemented would not infringe an existing patent.

We have been informed that, in 1993, patent infringement claims were made against New Jersey Transit by the holder of Patent No. 5,214,689, Next General Information, Inc. ("NGI"), arising from the installation of an interactive schedule information system available by telephone for New Jersey Transit riders. NGI, which had bid on the system installation, actually referred to the New Jersey Transit project in its patent application. New Jersey Transit, along with the winning bidder for the project, negotiated a one-time licensing fee of \$35,000 payable to NGI, split between New Jersey Transit and its project contractor. The fee entitles New Jersey Transit to a perpetual, non-exclusive license to make, sell and/or use an interactive information system having an unlimited number of ports solely for use by the agency. It also entitles New Jersey Transit to any subsequent US patents issued to or acquired by NGI for improvements to the patent. NGI may have alleged, and settled, similar claims against other rail and transit agencies.





# Scan of Existing Telephone Traveler Information Systems

## Interim Report

### ***Introduction***

Telephone systems that provide information to travelers can be classified into four categories:

- *Roadway Condition/Construction Information Systems:* These systems generally cover a whole state or a region. They provide construction/maintenance information and/or weather-related roadway conditions. Some systems also provide information about major events and accidents that have regional impacts and/or result in road closures.
- *Transit Information Systems:* These systems provide fixed route and/or paratransit information. Provided information includes fare, schedule, trip planning, detours, and in some cases bus delays or current bus location.
- *Traffic/Multi-modal Information Systems:* These systems provide real-time route specific traffic information such as incidents, congestion limits, travel time, and diversion routes. Some systems also provide multi-modal information such as bus, paratransit, ferry, rail, airplane, and bicycles information. Other provided information includes parking, ridesharing, and telecommuting.
- *Private Sector Audio Portals:* With these systems, a user can call a toll free number and use a spoken command to get information and connect with a variety of services including traffic, travel direction, tourist information, taxi, business, news, weather, sport, entertainment, lottery, and others.

Weather-related roadway conditions, incidents, travel time, vehicle delay, transit delay and transit vehicle locations are dynamic information and are updated in real-time as conditions warranted. Construction information, transit route, transit fare, transit schedule and airplane/rail schedules are generally static, although, they can be updated as required.

This paper provides a review of existing telephone-based traveler information systems in the U.S. The paper is not a comprehensive survey of all such systems. Rather, its objective is to gain a better understanding of the implementations and operations of systems that represent each of the above four categories. *This survey is a work in progress and this paper should be considered as an interim paper of the study.*

### ***Survey Methodology***

Systems representing each of the four categories, listed in the previous section, have been studied based on the followings:

- Telephone calls have been made to the systems to identify the information provided by the systems and the types of the user interface of the systems.
- Telephone calls have been made to system operators or operating agency representatives to ask questions regarding the implementations and operations of the systems. The telephone systems that are included in this study are the ones that we were able to interview their operators or agency representatives.
- A review of the literature has been made to collect information from previous studies that evaluated the systems that are considered in this study.

Tables 1 to 4 present the results obtained so far in the study.

Table 1 - Summary of Road Condition Information Telephone Survey

| System                 | Number          | Date Initiated | Operation Time            | Area Covered  | Interface                                      | Operating Agencies                                  | Usage (calls)   | No. of Lines               | Funding            | User Fees                               | Information Provided   | Information Source  | Lessons Learned  |
|------------------------|-----------------|----------------|---------------------------|---|--|---|---|----------------------------|--------------------|---|--|---|--|
| California             | 1-800 427-Road  | 1964           | 24 hrs<br>7 days a week   | California (statewide ) state highways                          | Touchtone menu. Recorded messages per route.   | Caltrans  | 2.6 million calls/yr. 4.7 million request for information | 404                        | State              | Cell time. Toll free in CA.             | Construction, major incidents (road closure), weather related road conditions. | TMCs and Caltrans dispatchers. Information updated as needed.                       | Do not use deep menu. Get callers in and out quickly to reduce toll charges.       |
| Florida DOT District 2 | 1-800 475-0044  | 1996           | 24 hrs<br>7 days a week   | Northern Florida (17 Counties)                                  | Touchtone menu. Messages per route.            | Florida DOT D2 (operated by their consultant.)      | 10-15 calls per day                                       | -                          | State              | Cell charges.                           | Construction.  | FDOT D2 fax information to consultant.  | -  |
| Montana                | 1-800 226-Road  | Mid 1980's     | 24 hrs<br>7 days a week   | Montana Interstates and major highways (statewide).             | Touchtone menu. Recorded messages per region.  | Montana DOT   | 40,000 to 50,000 for peak month.                          | 32 (Also 32 can be queued) | State and federal  | Cell charges are dropped by 3 carriers. | Construction and weather related road conditions.                              | District maintenance sections input data into ORACLE database. Forwarded to center. | Electronic sharing of information has been very effective.                         |
| Arkansas               | 1-800- 245-1672 | 20 years ago   | 24 hrs<br>7 days a week   | All Arkansas state highways                                     | One recorded message for the state.            | Arkansas State Highway Transportation Department    | 400 per normal month. In a 10 day storm, 50,000 calls.    | 6                          | State              | Cell time.                              | Weather related road conditions.   | Maintenance offices by telephone or radio. Information updated every hour in storm. | IVR would improve operation. Web-enabled telephone would save agency toll charges. |
| Nevada                 | 1-877- NVRoads  | -              | 24 hrs<br>7 days a week   | Nevada Interstates and state highways.                          | Touchtone menu. Messages per route.            | Nevada DOT  | 8,000 during a storm weekend in Reno.                     | 41                         | State              | Cell time.                              | Construction and weather related road conditions.                              | Districts enter data in ORACLE database. In storm, updates each hr.                 | IVR technology effective. Need to eliminate area-wide messages.                    |
| Pennsylvania Turnpike  | 1-800 331-3414  | 12 years ago   | 24 hrs<br>7 days a week   | Pennsylvania Turnpike   | Touchtone menu. Recorded messages per section. | Pennsylvania Turnpike                               | -   | 8                          | Turnpike Authority | Cell time.                              | Weather related road conditions, major accidents, construction.                | Calls to/from dispatch centers (police, towing) and maintenance offices.            | -  |
| Virginia               | 1-800 367-Road  | 7 years ago    | 24 hrs<br>7 days a week   | Virginia Interstates and primary roads                          | Touchtone menu. Recorded messages per route.   | Virginia DOT  | 1,000 weekly on average. Increased in bad weather.        | 76                         | State              | Cell time.                              | Weather related road conditions, major accidents, construction.                | Law enforcement, DOT field personnel. Radio, telephone, fax, and computer are used. | Train field personnel to provide information.                                      |
| Ohio DOT District 12   | 216-581 2333    | 4 years ago    | 24 hrs<br>7 days a week   | Ohio District 12 major highways                                 | Touchtone menu. Messages per region.           | Ohio DOT District 12.                               | 10 calls per day  | -                          | State              | Cell time and Long distance charged     | Construction and maintenance information.                                      | Maintenance yards compile lane closures daily and fax information                   | Diversion plans needed. Currently, Low public interest.                            |
| Arizona                | 1-888- 411-Road | 1992           | 24 hours<br>7 days a week | Statewide (and some adjacent states) highways and local Streets | Touchtone menu. Recorded messages per route.   | Arizona DOT TMC share information with 89 Agencies. | 5k to 10k calls/month (19 k in March 2000)                | 24                         | State              | Cell time.                              | Construction, weather related conditions, and accidents conditions.            | Authorized agencies enter information forwarded to the center.                      | Multi Agency coordination Understand system capabilities. Understand prices.       |

Table 1 - Summary of Road Condition Information Telephone Survey

| System                     | Number         | Date Initiated | Operation Time            | Area Covered                            | Interface   | Operating Agencies                                  | Usage (calls)  | No. of Lines                 | Funding                | User Fees                   | Information Provided  | Information Source  | Lessons Learned  |
|----------------------------|----------------|----------------|---------------------------|---|---|---|--|------------------------------|------------------------|-----------------------------|---|---|--|
| Yosemite National Park, CA | 209-372 200    | Early 1990s    | 24 hours<br>7 days a week | Yosemite National Park, CA              | Touchtone menu. Recorded messages for the whole park. | National Park Services (info. Provided to Caltrans) | 40 per day fall and winter, 60 in spring and 100 in Summer | 12 auto.<br>1 live operator. | National Park Services | Cell time.<br>Long distance | Road conditions, weather, transit connection, > 1 hr blocking accidents, Restricted oversize veh. | Dispatchers use radio when needed to report problems. National weather service. Manual recording of messages. | They tried two different systems. Both had technical problems.             |
| Chicago                    | 1-800 452-4368 | 1989           | 24 hrs<br>7 days a week   | Illinois Interstates                    | Touchtone menu. Recorded messages per route.          | Illinois DOT  | 10,000 calls per hour in winter storm                      | 40                           | State                  | Cell time.                  | Construction and weather related road conditions.   | Maintenance personnel report problems to their office or center. 2-4 hr updates in storm.                     | In bad weather, system overloads. 511 publicity might overload the system. |
| Kentucky                   | 1-800 4KY-Road | Mid 1990's     | 24 hrs<br>7 days a week   | Kentucky interstates and major highways | Touchtone. Messages per route.                        | Private company under contract to KYTC              | 150-200 normal day. 12K in snow events.                    | 22                           | State                  | Cell time.                  | Construction and weather related road conditions.   | Districts enter data in a computer program. Data Forwarded to center.   | Preformatted messages and simplified data entry should be used.            |

Note: DOT= Department of Transportation, KYTC= Kentucky Transportation Cabinet.

Table 2 - Summary of the Transit Information Telephone Survey

| System                  | Number       | Date Initiated  | Operation Time  | Area Covered                       | Interface  | Operating Agency                                       | Usage   | Number of Lines                               | Funding                              | User Fees                        | Information Provided   | Information Source   | Lessons Learned  |
|-------------------------|--------------|-----------------|---|------------------------------------|--|--|---|---|--------------------------------------|----------------------------------|--|--|--|
| Houston, Texas          | 713-635-4000 | 20 years ago    | 6 AM - 9 PM weekdays.<br>8 AM - 8 PM weekends.<br>24 hours automatic.   | Harris County                      | Operator + touchtone menu with automated messages (English / Spanish).                 | Houston Metro.   | 1.8 million per year.                                     | 38 operator lines.<br>48 lines for automated. | FTA plus county funds.               | Cellular fee plus long distance  | Static.<br>Delay if requested.                                 | Operator uses hard copy of schedules.<br>Delay from Transtar web site and dispatchers. | Qualified staff shortage.<br>Need data fusion software.<br>Simple menu/short cuts.   |
| Broward County, Florida | 934-357-8400 | 20 years ago    | 7 AM - 10 PM weekdays<br>7 AM - 8:30 PM Sat.<br>8:30 AM - 5 PM Sun      | Broward County                     | Live operator (Spanish if on duty).  | Broward County Mass Transit                            | 1,300 per weekday.  | 16 lines                                      | County                               | Cellular fee plus long distance  | Static.<br>Delay if requested.                                 | Hardcopy for schedule. Delay from dispatchers.   | Needs for regional information.<br>Interagency corporation and timely delay detour information.  |
| King County, Washington | 206-553-3000 | 20-30 years ago | 24 hrs/day automatic.<br>18 hrs/day operators.                          | King County (Seattle area).        | Operator + touchtone menu with automated messages (AT&T translators).                  | King County Metro Transit                              | 1 million per year.                                       | -   | County + contracts w other agencies. | Cellular fee plus long distance  | Static.<br>Delay if requested.                                 | AVL data accessed by supervisor.<br>Schedule read from computer.                       | Paperless environment. Real-time information. Automation of some functions. TTY has been useful.<br>AT&T foreign language translation has been useful. |
| Lexington, Kentucky     | 859-253-4636 | 1996            | 6 AM-10 PM weekdays.<br>10 AM - 6 PM weekends.                          | Fayette County                     | Live operator.   | Lextran  | 32 calls per hr.  | 5 lines                                       | County                               | Cellular fee plus long distance  | Static.  | Operator reads schedule from hard copy   | Software/system should be selected carefully. Software failure caused problems.  |
| Jacksonville, Florida   | 904-630-3100 | 7 years ago     | 6 AM - 7 PM weekdays.<br>8:30 AM-4:30 PM weekends.                      | Jacksonville                       | Live operator.   | Jacksonville Transportation Authority                  | 4,000 calls per week.                                     | 9 lines                                       | City Federal, state.                 | Cellular fee plus long distance. | Static.<br>Delay if requested.                                 | Schedule is read from computer. Delay from dispatchers.                                | Needs for real-time information.   |
| Southern Pennsylvania   | 215-580-7800 | 35 years ago    | 6 AM - 8 PM.<br>24 hours automatic.                                     | Philadelphia and surrounding areas | Operator plus touchtone menu with automated messages (Spanish for automated messages). | Southern Pennsylvania Transportation Authority (SEPTA) | 2 million/yr for operator.<br>1 million/yr for automatic. | 27 operator lines.<br>32 lines for automated. | SEPTA                                | Cellular fee plus long distance  | Static.<br>Delay if requested.<br>Connection to SmartTraveler. | Schedule is read from computer. Delay from dispatchers.                                |  |
| Milwaukee, Wisconsin    | 414-344-6711 | 20 years ago    | weekdays: 5 AM to 10 PM. Weekends: 6 AM to 6 PM.<br>24 hours automatic. | Milwaukee County                   | Operator plus touchtone menu with automated messages.                                  | Milwaukee Transport Services                           | 2000 per day.   |   | County funds                         | Cellular fee plus long distance  | Static.<br>Delay if requested.                                 | Schedule is read from computer. Delay from dispatchers.                                | Real time bus detour/delay information needed. Qualified live operators are needed.  |
| Stamford, Connecticut   | 203-327-7433 | 25 years ago    | 7 a.m. to 7 p.m.  | 6 towns (Stamford area)            | Live Operator  | CT Transit   | 500 calls per day.  | 9 lines.                                      | CT Transit (state agency)            | Cellular fee plus long distance  | Static.<br>Delay if requested.                                 | Operator uses hard copy of schedules.<br>Delay from dispatchers                        | Real time information is important. Automatic messages useful for certain inquiry to save operator time.   |

Table 2 - Summary of the Transit Information Telephone Survey

| System                 | Number                       | Date Initiated | Operation Time   | Area Covered                        | Interface                        | Operating Agency                      | Usage  | Number of Lines | Funding  | User Fees                       | Information Provided               | Information Source   | Lessons Learned   |
|------------------------|------------------------------|----------------|--|-------------------------------------|----------------------------------|---------------------------------------|--|-----------------|--|---------------------------------|------------------------------------|--|---|
| Denver, Colorado       | 303-299-6000<br>800-365-7433 | 25 years ago   | 6 a.m. to 8 p.m. weekdays.<br>8 a.m. to 8 p.m. weekends.   | Denver Metropolitan Area            | Live operator (English/Spanish). | Regional Transportation District      | 4100 calls per day/up to 6000 calls.                       | -               | Federal and state                                    | Cellular fee                    | Static. Bus location if requested. | Schedule is read from computer. AVL data accessed by supervisor. | Intensive operator training is important.   |
| Minneapolis, Minnesota | 612-341-4287                 | Long time ago. | Weekdays 6:30 AM to 9:00 PM, Saturday: 7:00 AM to 4:30 PM, Sunday 9:00 AM to 9:00 PM. Automatic 24 hrs/7days | Minneapolis St. Paul 7 county area. | Automatic (English)              | Metro Transit                         | 800,000 calls per year. operator. 2 million, automated.    | 72              | 30% from fare box. Reminder local, state and federal | Cellular fee plus long distance | Static                             | Use Automated transit itinerary system (starting 1999).          | Qualified staff shortage. Intensive training is used. Survey showed high user satisfaction/confidence. There is a need to meld voice recognition and trip planning. |
| Topeka, Kansas         | 785-354-9571                 | Long time ago. | 6 a.m. to 6 p.m.   | Topeka                              | Live operator                    | Topeka Metropolitan Transit Authority | Normally low, <100 per day. Much higher in special events. | 2 lines.        | Transit Authority                                    | Cellular fee plus long distance | Static. Delay if requested.        | Operator uses hard copy of schedules. Delay from dispatchers.    | Operator must be friendly and accessible.   |

Table 3 - Summary of Traffic/Multi-Model Information Telephone Survey

| System                            | Number                                       | Date Initiated                       | Operation Time   | Area Covered   | Interface   | Involved Agencies  | Usage   | Number of lines                               | Funding   | User Fees   | Information Provided   | Information Source  | Lessons Learned   |
|-----------------------------------|--|--------------------------------------|--|--|---|--|---|---|---|---|--|---|---|
| California                        | 1-800-commute                                | 1994 (during LA earthquake response) | 24 hours a day<br>7 days a week  | Northern CA, Southern CA, San Diego.   | Touchtone. English & Spanish.                                     | Caltrans (agreements with other transp. agencies)                              | 3 Millions per year                               | North CA = 4<br>South CA = 48<br>San Diego=10 | Caltrans  | Cell time. Toll free is statewide.                      | Connects calls to transit, rail, ridesharing, and telecommuting agencies.  | No direct information provided. System reroute calls to others.   | High user satisfaction. Users want multi-modal info. and all mode information in one call.  |
| Branson, Missouri                 | 1-877-4tripinfo                              | 1997                                 | 24 hours a day<br>7 days a week  | Major roads in Branson area.   | Touchtone menu.   | Missouri DOT, City of Branson, Police, and 911.                                | 4-10 calls per day                                | 4   | Missouri DOT and City of Branson.               | Cell time. Toll free is regional.                       | Incidents, special events, major construction, alternative routes.   | Data collected from sensors, cameras, police, construction and weather agencies. Data entered in a computer at 911 center.          | Low awareness of system. High satisfaction.   |
| Rhode Island                      | 1-800-354-9595                               | One year ago                         | 6 AM to 10 PM weekday  | Rhode Island Interstates   | Manual (Operator at TMC).   | Rhode Island DOT.  | 4 calls per day                                   | 2   | Rhode Island DOT                                | Cell time plus long dist.                               | Incidents, emergency, and construction information.  | TMC software, police and traveler calls.  |   |
| Orange County, California         | 949-451-1847                                 | Currently in Beta testing            | Agencies enter info. as needed. Operators work in peak periods.                            | Orange County, CA  | Touchtone menu/ messages per route.                               | Caltrans, Orange County, FHWA and cities. Connections to transit agencies.     | Beta testing                                      | 22 (will be expanded)                         | FHWA, Caltrans, and Orange County.              | Cell time plus long distance.                           | Congestion info., TT by route, direct connection to transit agencies, construction.  | 34 Agencies in the county can enter data.   | Be sure of the capability of selected technology. Make system intuitive. Avoid 3 level deep menus.  |
| Travinfo, California              | 817-1717<br>817-1718 (TTY)<br>(6 Area Codes) | 1996                                 | 24 hours a day<br>7 days a week  | 9 Counties in San Francisco Bay area   | Touchtone menu/ recorded messages per route.                      | Metropolitan Transportation Commission, Caltrans, CHP, and cellular companies. | 70,000 calls per month                            | 154   | Mixture, mainly CMAQ.                           | Cell time plus long distance.                           | Weather, incidents, diversion (in case of closure), major transit delays. Provide connections to transit agencies.                             | Caltrans cameras, detectors, cell phone reporters, CHP, maintenance, other agencies through operator calls.                         | Simplify menu. Automate Data entry. Incorporate transit info. Users are satisfied. Needs interjurisdictional trip plans, better data quality/timeliness, and public awareness activities. |
| Minneapolis / St. Paul, Minnesota | 651-633-8383                                 | 1998                                 | 5:30 AM to 7:30:00 PM WD.<br>Non real-time: 24 hours<br>7 days a week                      | Freeways and Major roads in 11 Counties in Minneapolis area.                   | Touchtone menu/ recorded messages per route.                      | Operated by Smart-Route for the Minnesota DOT                                  | 4,000 to 6,000 per day (triple during storms)     | 96  | Public fund, Web advertisement and info resell. | Cell time charges dropped. Long dist. charged.          | Incidents, TT diversion, transit delays, airport, parking, weather, road conditions. Transit agency connections.                               | Loops, aircraft, CCTV, reporters, police/fire communication, transit, construction. Bidirec - tional calls and faxes.               | Public vs. private sector expectations. Required skills. Scrutiny from media/public. Evaluation show the provided information is accurate.  |
| Boston, MA                        | 617-374-1234                                 | 1993                                 | 5:00 AM to 9:00:00 PM WD.<br>10:00 AM to 7:00:00 PM WE.<br>Non real-time: 24 hrs all week. | Interstates and Major roads in Boston.   | Touchtone menu/ recorded messages per route.                      | Operated by Smart-Route for the Massachusetts Highway Department               | 12k to 15k per day. 40 k busy days.               | Can receive 7,000 calls /hr                   | Public fund, Web advertisement and info resell. | Cell time charges dropped. Long dist. charged.          | Incidents, TT, diversion routes, transit updates & delays, airport, parking, car share, road conditions, water shuttle. Connection to transit. | CCTV, mobile reporters, police, fire communication, transit agency, port authority, construction. Bidirec - tional calls and faxes. | Use private sector experience. Marketing & cellular time charge elimination increases use. Dealing with carriers is difficult. Callers are satisfied.                                     |
| Chicago Illinois                  | 847-705-4620                                 | Automated System is New              | 24 hours<br>7 days of the week   | Chicago Expressways.   | Touchtone menu/ recorded messages per route.                      | Illinois Department of Transportation TRW, SmartRoute.                         | Few calls mostly from media                       | 1   | State fund                                      | Cell time and long distance.                            | TT, incidents congestion limits, links to road s phone list for transit agencies.  | Detectors information from TMC, service patrol and police. Enter information into computer.   | Good relation necessary with media. Public agencies do not always need private sector to develop these systems.   |
| Washington State                  | 206-DOT-HIWAY                                |                                      | 5:30 AM to 7:30PM WD.<br>9:00 AM to 6:00 PM WE.<br>Non real-time: 24 hrs all week.         | Road information statewide. Traffic and transit, Seattle and Tacoma statewide. | Touchtone menu/ traffic for all metro area. road cond. per route. | Washington DOT   |   |   |   |   | Lane closures, blocking incidents, congestion locations, road condition, construction, ferry schedule updates, transit and car share rept.     |   |   |
| Georgia                           | 404-635-8000<br>404-635-8800<br>"DOT" (*368) | 1996                                 | 24 hours a day<br>7 days a week  |  | Live operator   | Georgia DOT  | 400 per day on average. 1000 per day on busy day. | 10 lines                                      | State and Federal                               | Cell time dropped by basic company. long dist. charged. | Road conditions, traffic conditions, construction, detours (if available).   | Navigator system detectors, camera. Maintenance dept. highway patrol, helicopter calls. Operators read from computer.               | It appears that live operators work well. Users like the fact that a live operator answer the telephone.  |

Table 3 - Summary of Traffic/Multi-Model Information Telephone Survey

| System  | Number                | Date Initiated               | Operation Time  | Area Covered   | Interface   | Involved Agencies   | Usage                       | Number of lines | Funding  | User Fees                                      | Information Provided  | Information Source   | Lessons Learned   |
|---|-----------------------|------------------------------|---|--|---|---|-----------------------------|-----------------|--|--|---|--|---|
| Washington area, District of Columbia, Maryland, Virginia | 202-863-1313          | 1988 (Limited Start in 1997) | ?? AM to 9:00:00 PM WD. 10:00 AM to 7:00:00 PM WE. Non real-time: 24 hrs all week.  |  | Touchtone menu\ recorded messages per route.            |   |                             |                 |  |  | TT, incidents, diversions?, congestion limits?, road conditions, construction, transit, ride share and paratransit updates and connections to agencies. |  | System improves customer satisfaction. System affects traveler choice, especially route choice.   |
| Lexington, Kentucky                                       | (859) 258-3611 *311   | 1996                         | 24 hours a day road conditions. Incidents: 6 AM to 9 AM and 4 pm to 6 pm, weekdays. | Central KY. (Lexington and surrounding 7 counties) fwys and major arterials. | Touchtone menu\ recorded messages for the whole region. | Traffic Information Network (city and County. Information is shared with transp. agency, media, and 2 private info. Providers | 8,000 to 10,000 per year.   | 6               | Equipment: federal grants. Operation & maintenance: city and County. | Cell charges by the major cell company         | Traffic incidents (report injury and conditions around incidents), any detours, construction, emergency road cond., Ferry schedule updates.             | Fire and police dispatchers and radio. Private info. Providers (helicopters), CCTV cameras). Maint. info. from local and state dept. | Publicity important. More Cellular companies should use the *311 number. The selected technology is important. A black box technology makes working with the system difficult.  |
| Cincinnati OH and Northern Kentucky                       | 211 or (513) 333-3333 | 1995                         | 6:00 AM to 7:00:00 PM WD Non real-time: 24 hrs all week                             | Major roads in the area.   | Touchtone menu\ recorded messages per route.            | Kentucky Transp. Cabinet, Ohio DOT, FHWA, OKI-Council of Government, City of Cincinnati.                                      | 50k to 100k calls per month | 96              | Public fund, Web advertisement and info. resell.                     | Cell time charges dropped. Long dist. charged. | TT, incidents, speed limits, incident durations, alternative routes, congestion limits, transit delays. Connect to transit.                             | Detectors, mobile reporters, const., fire and police dispatchers, weather. Two-way communication with police and transit.            | Good/experienced staff important. Users are satisfied. Expand traffic information coverage. Institutional issues should be resolved up front. Should set Policy and procedures. |

Note: TT=travel time, WD = weekday, WE = weekend, CHP = California Highway Patrol, TMC = traffic management center, CMAQ = The Congestion Mitigation and Air Quality Program, DOT = Department of Transportation, FHWA = Federal Highway Administration.



**Table 4 - Summary of the Private Audio Portals Survey**

| <b>System</b> | <b>Number</b>   | <b>Date Initiated</b> | <b>Operation Time</b>             | <b>Area Covered</b>  | <b>Interface</b>   | <b>Traffic Information</b>                               | <b>Information Source</b> | <b>Other Information Provided</b>   | <b>Funding</b>  | <b>User Fees</b>                              |
|---------------|-----------------|-----------------------|-----------------------------------|--|--|--|---------------------------|---|---|---|
| Tellme        | 1-800-555-TELL  | 1999                  | 7 days a week/<br>24 hours a day. | Traffic for 65 cities in the U.S. (Other information available in all of U.S.) | English speech recognition and voice synthesis IVR. Route specific information. Interface & favorite routes can be set. Location of call automatically identified.                               | incidents, construction location and estimated duration. | Etak/metro                | Driving directions, travel, taxi, lotto, soap, movies, horoscopes, weather, news, stock, sports, restaurants. | Investment by capital firms and investors. Revenues are generated from promotions and building/deploying voice applications   | Toll free in the US. Cell time charges apply. |
| BeVocal       | 1-800-4-bevocal | 1999                  | 7 days a week/<br>24 hours a day. | Traffic for 65 cities in the U.S. (Other information available in all of U.S.) | English speech recognition and voice synthesis IVR. Route specific information. Interface & favorite routes can be set. Location of call automatically identified. WAP, fax, email, text paging. | incidents, construction location and estimated duration. | Etak/metro                | Driving directions, weather, news, business, sports, horoscopes, lotto, Soap opera, flight information.       | Investment by capital firms and investors. Revenues are generated from parties that use BeVocal applications. Outsource service or license software (e.g., Quest Wireless). | Toll free in the US. Cell time charges apply. |
| AudioPoint    | 1-888-38-Audio  | 1999                  | 7 days a week/<br>24 hours a day. | Traffic for 20 cities in the US. (Other information available for all US.)     | English speech recognition and voice synthesis IVR. Customized AM and PM routes. Recorded messages for all incidents in the city.  | Incident locations.                                      | SmartRoute                | business, sports, horoscopes, news updates, weather entertainment.  | AudioPoint is advertiser supported. The advertisements are 5 to 10 seconds in length and will be heard every 45 seconds.  | Toll free in the US. Cell time charges apply. |